US010915729B2

(12) United States Patent
Dinov et al.

(10) **Patent No.:** **US 10,915,729 B2**
(45) **Date of Patent:** **Feb. 9, 2021**

(54) **THREE-DIMENSIONAL CELL AND TISSUE IMAGE ANALYSIS FOR CELLULAR AND SUB-CELLULAR MORPHOLOGICAL MODELING AND CLASSIFICATION**

(71) Applicant: **The Regents of The University of Michigan**, Ann Arbor, MI (US)

(72) Inventors: **Ivaylo Dinov**, Ann Arbor, MI (US); **Brian D. Athey**, Ypsilanti, MI (US); **David S. Dilworth**, Ann Arbor, MI (US); **Ari Allyn-Feuer**, Ypsilanti, MI (US); **Alexandr Kalinin**, Ann Arbor, MI (US); **Alex S. Ade**, Ann Arbor, MI (US)

(73) Assignee: **THE REGENTS OF THE UNIVERSITY OF MICHIGAN**, Ann Arbor, MI (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 131 days.

(21) Appl. No.: **16/277,128**

(22) Filed: **Feb. 15, 2019**

(65) **Prior Publication Data**

US 2019/0258846 A1 Aug. 22, 2019

Related U.S. Application Data

(60) Provisional application No. 62/632,663, filed on Feb. 20, 2018.

(51) **Int. Cl.**
G06K 9/00 (2006.01)
G06K 9/46 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC *G06K 9/00147* (2013.01); *G01N 1/30* (2013.01); *G06K 9/0014* (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC G06K 9/00147; G06K 9/0014; G06K 9/00201; G06K 9/46; G06K 9/626;
(Continued)

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Primary Examiner — Michael R Neff
(74) *Attorney, Agent, or Firm* — Harness, Dickey & Pierce, P.L.C.

(57) **ABSTRACT**

The ability to automate the processes of specimen collection, image acquisition, data pre-processing, computation of derived biomarkers, modeling, classification and analysis can significantly impact clinical decision-making and fundamental investigation of cell deformation. This disclosure combine 3D cell nuclear shape modeling by robust smooth surface reconstruction and extraction of shape morphometry measure into a highly parallel pipeline workflow protocol for end-to-end morphological analysis of thousands of nuclei and nucleoli in 3D. This approach allows efficient and informative evaluation of cell shapes in the imaging data and represents a reproducible technique that can be validated, modified, and repurposed by the biomedical community. This facilitates result reproducibility, collaborative method validation, and broad knowledge dissemination.

21 Claims, 9 Drawing Sheets